Chapter 47: Pro Tools Setup for Surround

Pro Tools HD let you work with surround formats up to 7.1.

Surround Mixing in Pro Tools

(Pro Tools HD Only)

Pro Tools supports mixing in the following multichannel (greater than stereo) formats: LCR, Quad, LCRS, 5.0, 5.1, 6.0, 6.1, 7.0, 7.0 SDDS (Sony Dynamic Digital Sound), 7.1, and 7.1 SDDS.

For information on fundamental surround concepts, see the Pro Tools Sync & Surround Concepts Guide.

Pro Tools Audio Connections for 5.1 Mixing

While all 5.1 mixing formats provide the same speaker arrangement, there are three primary standards in use for the track layout of the individual channels that comprise the 5.1-format multichannel mix.

In the following table, it is assumed that surround channels are assigned to outputs 1–6 of a Pro Tools audio interface. Use channels 7–8 to monitor a stereo mix for a stereo version, or for cue mixes and monitoring.

Track Layouts for 5.1 Formats

Formats	Track Layout					
	1	**2**	**3**	**4**	**5**	**6**
Film (Pro Tools default)	L	C	R	Ls	Rs	LFE
SMPTE/ITU for Dolby Digital (AC3)	L	R	C	LFE	Ls	Rs
DTS	L	R	Ls	Rs	C	LFE
C|24	L	C	R	Ls	Rs	Lf

The following table shows the X-MON mono track routing for a 7.1 SDDS mix. A 5.1 mix should use the same routing, excluding outputs 2 and 4 (Lc and Rc).

Default Track Layout for 7.1 SDDS Format

Formats	Track Layout							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
X-MON	L	Lc	C	Rc	R	Ls	Rs	LFE

To connect your audio interfaces for 5.1 format mixing and monitoring:

1 Determine the 5.1 format and track layout you want to use.

2 Connect the output channels of your audio interface to the corresponding input channels of your monitoring system according to the assignments listed in the tables above.

If you use a control surface, see its guide for more information.

7.1 and 7.0 Formats

7.1 and 7.0 Format

HD-DVD and Blu-Ray systems use the following track layout for 7.1 and 7.0 surround formats:

- 3 front channels (Left, Center, Right)
- 2 side channels (Left Surround Side, Right Surround Side)
- 2 rear channels (Left Surround Rear, Right Surround Rear)
- 1 LFE channel (x.1 formats only)

The following table shows the default mono track routing for a 7.1 mix in Pro Tools.

Default Track Layout for 7.1 Format

Track Layout							
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
L	C	R	Lss	Rss	Lsr	Rsr	LFE

7.1 and 7.0 SDDS Formats

The Sony Dynamic Digital Sound (SDDS) 7.1 and 7.0 surround formats use the following track layout:

- 5 front channels (Left, Left Center, Center, Right Center, Right)
- 2 rear channels (Left Rear, Right Rear)
- 1 LFE channel (x.1 formats only)

The following table shows default mono track routing for a 7.1 SDDS mix in Pro Tools.

Default Track Layout for 7.1 SDDS Format

Track Layout							
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
L	Lc	C	Rc	R	Ls	Rs	LFE

Configuring Pro Tools for Multichannel Sessions

Configuring Pro Tools and sessions for multichannel mixing can be done in any (or all) of the following ways:

New Sessions

You can create a new session and choose a surround mix I/O Settings file as the *default* I/O Setup. See "New Sessions and I/O Settings" on page 1063.

Remixing Sessions in Surround (Importing Multichannel I/O Setups)

By creating or importing a surround mix I/O Settings file in the I/O Setup dialog, multichannel paths can be made available in any stereo (or other format) session. You can then reassign track routing from the original stereo paths to multichannel paths. Inactive and active paths simplify reassignment. See "Importing Multichannel I/O Setups" on page 1064.

Custom Multichannel Paths

You can customize and redefine existing paths in the I/O Setup dialog. For more information, see “Custom Multichannel Paths” on page 1065.

Importing Session Data

By using the Import Session Data command (File > Import > Session Data), you can import tracks and media from other sessions plus their associated paths and track assignments. After importing session data, you can use the I/O Setup dialog to configure main and sub-paths for the requirements of the session. For more information, see Chapter 7, “I/O Setup.”

New Sessions and I/O Settings

When you create a new session, you can specify a surround format that you want to use as your I/O Setup. Default path configurations are provided as I/O Settings files, for stereo and surround mixing.

⚠ *To see multichannel options in Pro Tools, the Surround Mixer plug-in must be installed in the Plug-Ins folder. This plug-in can be installed with Pro Tools (see the User Guide for your Pro Tools system). If it is not installed, you can move it from the Plug-Ins (Unused) folder to the Plug-Ins folder.*

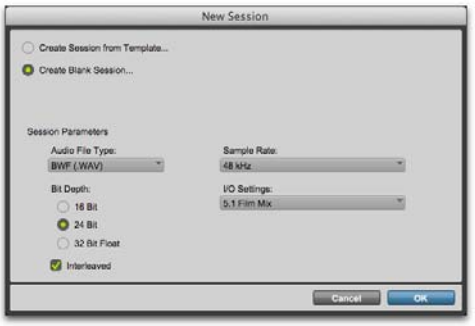
Once you create the new session, you can create and import tracks, import audio, and assign signal routing to set up your mix.

To create a new session for multichannel mixing:

1 Choose File > New Session.

2 Select the Create Blank Session option.

3 Select the Audio File Type, Sample Rate, and Bit Depth.



New Session dialog, 5.1 Film Mix I/O setting selected

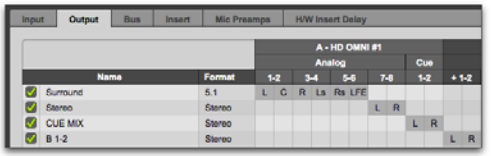
4 From the I/O Settings menu, select one of the following options:

- 5.1 Film Mix
- SMPTE/ITU
- DTS Monitoring
- C24 Mix
- ICON X-MON Mix

5 Click OK.

6 In the Save dialog, name the session, navigate to the location where you want to save the new session, and click Save.

The surround presets preconfigure the I/O Setup dialog for the new session with default 5.1 format main and sub-paths for outputs and busses.



Standard 5.1 format (film) output paths

Surround Mix Settings Files

The surround mix I/O Settings provide output and bus paths for six specific track layout standards in the new session. (For information on inputs and insert paths, see “Default Input and Insert Paths with 5.1 Settings” on page 1064.)

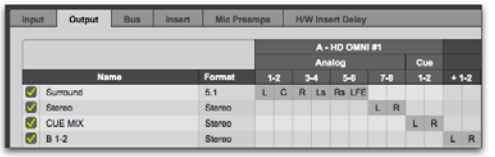
Settings Files and Track Layouts

5.1 Settings	Track Layout
5.1 Film Mix	L C R Ls Rs LFE
SMPTE/ITU Mix	L R C LFE Ls Rs
DTS Mix	L R Ls Rs C LFE
C24 Mix	L C R Ls Rs Lf
ICON X-MON Mix	L Lc C Rc R Ls Rs LFE

All available 5.1 format (and greater) I/O Settings (Film, SMPTE/ITU, DTS, C24 Mix, or ICON X-MON Mix) provide the following default output and bus paths for the new session:

Default 5.1 Output Paths

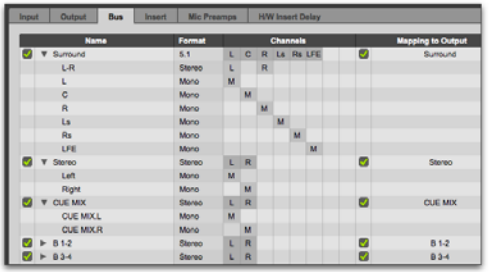
- One 5.1 main output path.
- One stereo main path.



I/O Setup, Output page, default 5.1 (Film) Output assignments

Default 5.1 Bus Paths

- One 5.1 main output bus path, with sub-paths for 5.0 (no LFE), left/right (stereo), LCR, and center (mono).
- One stereo main output bus path with two mono sub-paths.



I/O Setup, Bus page, default 5.1 (Film) Output Bus assignments

Default Input and Insert Paths with 5.1 Settings

The 5.1 Mix settings files provide default stereo main paths and mono sub-paths for inputs and inserts. If you need multichannel input paths or inserts, you can create them in the I/O Setup (see “Custom Multichannel Paths” on page 1065).

Importing Multichannel I/O Setups

The I/O Setup dialog can import and export settings files. This is useful when you want to remix a stereo session in surround. You can also use this feature to prepare a session for transfer to a different Pro Tools system, or to save and exchange I/O Settings.

To import a multichannel I/O Setup settings file:

1 Choose Setup > I/O.

2 Click the Output tab.

3 Click Import Settings.

4 Select the settings file (.pio) to import and click Open.

5 If the current session has path definitions that do not match those in the imported settings file, Pro Tools asks whether you want to delete the existing paths or retain them and add the imported settings to your session.

- Click No to add new paths to your current I/O Setup configuration.
- Click Yes to replace your current I/O Setup configuration with the imported settings.

6 Click the Bus tab.

7 If the Bus page does not show the correct output bus mappings for the imported I/O Settings file, click the Default button (for All Busses or for Output Busses).

8 Click OK to close the I/O Setup.

Exporting I/O Settings

Exporting I/O Setup settings files lets you build a library of multichannel setups for different projects.

To export an I/O Setup settings file:

1 Choose Setup > I/O.

2 Click Export Settings.

3 Name and Save your current I/O Settings.

Custom Multichannel Paths

The I/O Setup dialog lets you create and customize signal paths for any supported multichannel mixing format.

Multichannel paths and sub-paths are assigned to input and output channels in the Channel Grid. When you select a preset 5.1 I/O Settings file, default layout for the corresponding multichannel format paths you create will match the selected format's track layout.

In addition, the I/O Setup dialog, like the Main page of the Hardware Setup dialog, provides controls for routing the physical inputs and outputs on your audio interface to available inputs and outputs in Pro Tools.

When creating 5.1 format paths, you can specify the default track layout. See "Default Path Order for 5.1 Tracks" on page 1067.

Reassigning Channels

The I/O Setup dialog and its Channel Grid also let you reassign channels. This is especially useful for routing channels within a multichannel path, without having to repatch your audio interfaces.

You can reassign paths to any required configuration, limited only by your systems resources, and the I/O Setup dialog requirements for channel overlapping and naming (see "Valid Paths and Requirements" on page 89 for more information).

See also "Example Paths and Signal Routing for a Surround Mix" on page 1077.

Example LCRS Setup

The following example shows one possible way to configure the I/O Setup dialog to mix in 4-channel LCRS format, with an HD OMNI.

For additional I/O Setup information, see "Output Busses" on page 90.

To define an LCRS path:

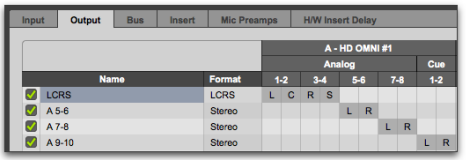
1 Choose Setup > I/O, and click the Output tab.

2 Click New Path.

3 Select LCRS from the Path Format selector.

4 Name the path LCRS.

5 In the Channel Grid, click in the box below the first (left-most) audio interface channel for the path. Pro Tools automatically fills up the adjacent units to the right. If you click in the LCRS row under channel 1, the LCRS path will be assigned to channels 1–4.



Output page, LCRS output path

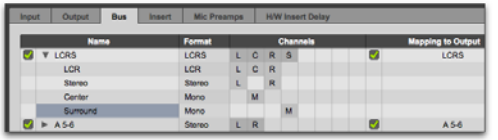
6 Click the Bus tab.

7 If the Bus page does not show the correct output bus mappings for the LCRS output, click the Default button (for All Busses or for Output Busses).

8 Select the new LCRS path and click the Reveal Sub-paths triangle.

9 If not all of the sub-paths are present, do the following:

- Click New Sub-Path.
- Name the new sub-path LCR and select LCR as the Path format. Click in channel 1 in the LCR row to assign the bus path.
- Select the LCRS path, click New Sub-Path, and create a stereo sub-path for front Left and front Right.
- Select the LCRS path, click New Sub-Path, and create a mono sub-path for the Center channel.
- Select the LCRS path, click New Sub-Path, and create a mono sub-path for the Surround channel.



Bus page, LCRS output bus with sub-paths

10 Click OK to close the I/O Setup.

5.1 Tracks, Formats, Assignments, and Metering

Path definitions in I/O Setup determine how audio is routed through, and metered on, your audio interfaces.

Pro Tools internal (on-screen) metering of 5.1 format paths always follows the Film track layout:

L C R Ls Rs LFE

Pro Tools track layout of 5.1 format audio tracks in the Edit window also conforms to the Film layout (arranged top to bottom). See "5.1 Track Layouts, Routing, and Metering" on page 1068

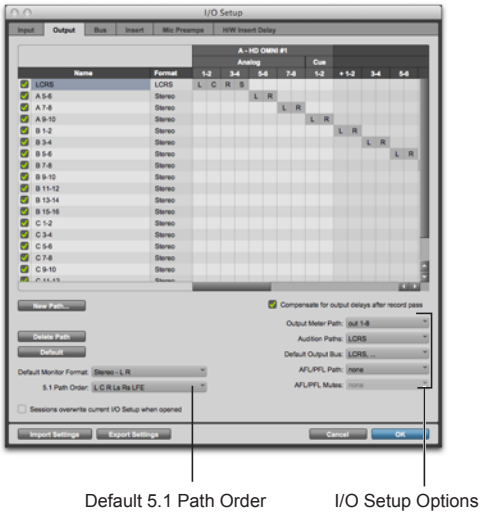
In the I/O Setup dialog, you can route these signals out of your audio interfaces according to any track layout (such as DTS or SMPTE/ITU).

To re-assign channels in a path:

- Drag a channel to a new valid location in the Grid. Other channel assignments will move (shuffle) to accommodate dragged channels.

Default I/O Selectors in I/O Setup

The Output page of the I/O Setup dialog provides selectors for setting I/O defaults in your multichannel sessions.



Default selectors in the I/O Setup dialog

Default Monitor Format Sets the default monitor format (Stereo, 5.1, or 7.1) for new Output paths and for when you click the Default button.

5.1 Path Order Selects the default track layout (or, path order) for new 5.1 format (six-channel) Output paths.

Output Meter Path Selects the path that will be shown in the control surface output meters as well as in the Transport Output meters. See "5.1 Tracks, Formats, Assignments, and Metering" on page 1066 for more information.

Audition Paths Selects the monitoring path for previewing audio in the Clip List, Import Audio dialogs, and a Workspace browser. Only outputs on your primary interface can be used as your Audition path.

Default Output Bus Selects the default output bus path for all new tracks, for each supported track format.

The New Track Default Output can be set to bus paths, as well as output paths.

AFL/PFL Path (Pro Tools|HDX or Pro Tools|HD Native Systems Only) Selects where tracks are routed to when they are soloed in AFL (After Fader Listen) or PFL (Pre Fader Listen) Solo mode.

AFL/PFL Mutes (Output Path) (Pro Tools|HDX or Pro Tools|HD Native Systems Only) Selects which output is muted when AFL (After Fader Listen) or PFL (Pre Fader Listen) Solo mode is enabled, and a track is soloed.

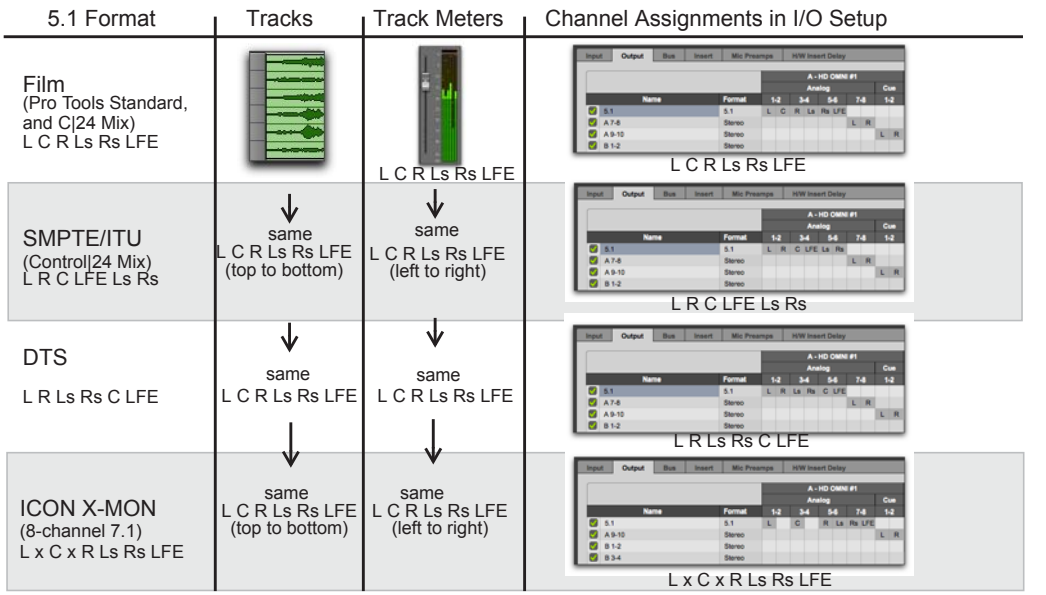
Default Path Order for 5.1 Tracks

You can specify the default track layout for all new 5.1 format paths you create.

To choose a new default 5.1-format path order (track layout):

1. Choose Setup > I/O.
2. Click the Output tab.
3. Use the 5.1 Default Path Order setting to select the track layout you want (Film, SMPTE/ITU, or DTS Monitoring).

5.1 Track Layouts, Routing, and Metering



Track layout of different 5.1 formats

Chapter 48: Multichannel Tracks and Signal Routing

Surround sessions typically include a combination of mono, stereo, and multichannel audio, Auxiliary Input, Master Fader, and Instrument tracks, and inserts and busses.

⚠ *Multichannel surround mixing is supported with Pro Tools HD only.*

Once the appropriate I/O Setup has been imported or configured, audio, Auxiliary Input, Master Fader, and Instrument tracks can be mixed in multichannel for surround using Pro Tools mixing features.

Multichannel I/O and signal routing is determined by the paths defined in the I/O Setup dialog.

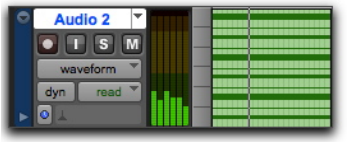
Multichannel Audio Tracks

(Pro Tools HD Only)

Multichannel audio tracks contain an individual channel for each signal in the track (for example, a 5.1 track would have six channels for left, center, right, left surround, right surround, and LFE).

Multichannel audio tracks can be:

- Recorded directly into Pro Tools, using multiple microphones or microphone arrays, or routed to appropriate multichannel Pro Tools Input paths
- Imported from other Pro Tools sessions
- Edited, processed, and mixed in combination with mono and stereo tracks



5.1 format multichannel audio track

5.1 format audio files and tracks conform to the Film track layout standard. Regardless of path assignments in the I/O Setup dialog, all 5.1 format audio tracks and meters follow the Film standard track layout:

L C R Ls Rs LFE

Multichannel audio tracks are not required to mix in multichannel formats. Mono, stereo, and all supported track formats can be mixed using Pro Tools track outputs and sends (see "Multichannel Signal Routing" on page 1072).

Placing Audio in Multichannel Tracks

You can drag audio files and clips from Workspace browsers, the Clip List, Windows Explorer, or Mac Finder, or from other tracks, to place them in multichannel audio tracks.

To do so, the number of channels being dragged must match the destination track format. For example, you can only drag a stereo pair or two mono clips onto a stereo audio track. Similarly, you can only place audio into an LCR track when you have selected three clips. With 5.1 tracks, you must select six mono files or clips.

⚠ *When dragged into a multichannel track, audio files are placed from top to bottom in the exact order that they appear in the Clip List or playlist from which they came (Top to Bottom must be selected for in the Clip List menu > Timeline Drop Order). For this reason, you may want to rename audio files before dragging them, so that they are placed in the preferred order. Rename them so that sorting them By Clip Name in the Clip List results in the preferred order. (For example, with a 5.1-format track, you can rename the audio tracks so that the arrangement of the tracks corresponds to L, C, R, Ls, Rs, and LFE.)*

Solo, Mute, and Gain in Multichannel Tracks and Paths

Stereo and multichannel tracks consist of multiple audio signals, linked together. By default, multichannel tracks are linked and are controlled by a single channel fader, and solo and mute switches.

For discrete control of signals, multichannel tracks can be converted into individual mono tracks. For discrete level and phase adjustment, you can insert and unlink a multi-mono Trim plug-in. Both of these techniques are explained below.

⚠ *Once converted to mono, multichannel tracks cannot be relinked into their original multichannel format. However, a multichannel track can be reassembled by dragging the corresponding number of mono files (with the appropriate file suffixes) into a multichannel track, although some automation data may be lost. As an alternative, record the submix of the mono tracks to disk on a multichannel track.*

To convert a multichannel track into discrete mono tracks:

1. Select the multichannel track.
2. Choose Track > Split Into Mono.

To have discrete control of gain on individual channels of a multichannel track:

1. Insert a multi-mono Trim plug-in on the multichannel track.
2. Unlink the Trim plug-in by clicking the Link icon so that it is unlit.
3. Use the Channel selector to display the controls for a channel, and adjust the gain.

See "Linking and Unlinking Controls on Multi-Mono Plug-Ins" on page 1074 for more information.

Track and Output Formats

When you create new tracks, you specify mono, stereo, or a supported multichannel format for the new tracks.

In the Mix and Edit windows, the track format of a track's output is always visible by the number of track meters contained in its fader strip (for example, a single meter for mono tracks, a pair of meters for stereo tracks, and six meters for 5.1 tracks).

Assigning track output determines the format of that output. For example, a mono track always has a single track meter, even when assigned to a stereo output path. If that same mono track is assigned to a 5.1 output path, it's output will be split among those six output channels, depending on the position of its panner.

Changing Format

Changing the output format for a given track has several effects:

- The panner that appears in the track will change to reflect the new output format.
- It may be necessary for one or more pan related automation playlists to be created or deleted.

Because changing the output format has these effects, a warning dialog appears whenever you change the output format of a track to a format of fewer channels. Specifically, this will occur whenever automation playlists will have to be deleted.

Multiple Output Assignments and Track Format

When a track is assigned to more than one path of differing formats, the main output for that track will match the format of the assigned path with the greatest number of channels.

Multiple Outputs and Automation Playlists

When a track has multiple output assignments, Pro Tools sorts panning data appropriately for each assigned path. For example, if you assign a mono track to a stereo path and a 5.1 path simultaneously, that track will have a 5.1 panner in the Mix or Edit window. When you pan the track, Pro Tools interprets the 5.1 panning moves into stereo panning moves.

This provides a type of parallel mixing. You can create a variety of mixes of differing formats all at the same time by routing your elements to multiple paths.

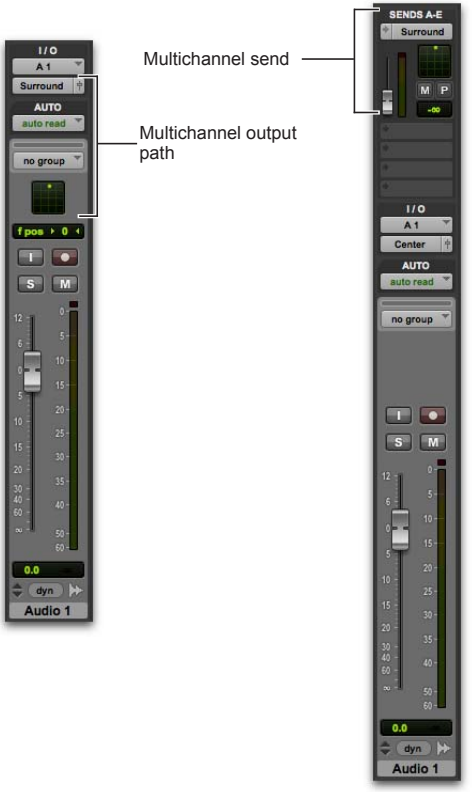
Command-Control-click (Mac) or Control-Start-click (Windows) any control in an Output window to show its automation playlist in the Edit window and view any pan automation.

Multichannel Signal Routing

To mix in a multichannel format, tracks are assigned to multichannel paths.

Tracks can be mixed in surround using the following two methods:

- By setting a track main output to a multichannel path.
- By assigning a multichannel send to route audio to a multichannel path.



Two different ways to configure tracks for multichannel mixing

Multichannel Track Outputs

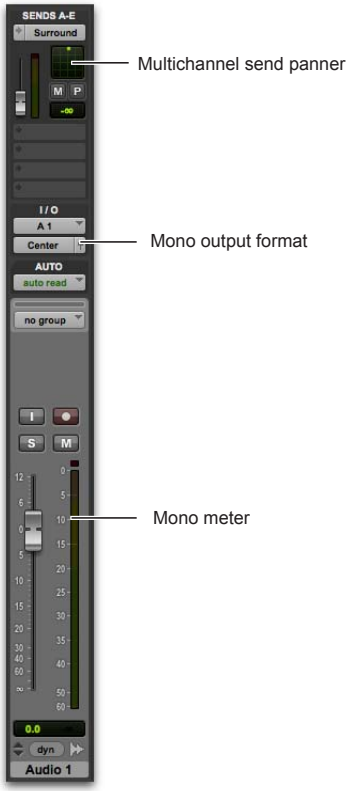
Tracks can be routed to multichannel output or bus paths using the track's Output Path selector. This provides a multichannel panner and meter in the Mix and Edit window I/O View.

Additional output assignments can be added by Start-clicking (Windows) or Control-clicking (Mac) the Selector tool and assigning another path.

Multichannel Sends

All track formats, including mono and stereo, let you assign one or more multichannel sends. This provides a multichannel panner in the Sends View. Sends are also useful to bus tracks for multichannel plug-in processing.

The following figure shows a mono audio track with a 5.1 (6-channel) send (View > Sends A–E > Send A).



A mono audio track with a mono output format and a multichannel send

Pro Tools bussing and submixing features are available for all channel formats, from mono/stereo through 8-channel. For examples of multichannel monitoring, effects processing, and bussing, see “Mixing with Paths and Sub-Paths” on page 1075. For mono and stereo mix examples, see Chapter 43, “Basic Mixing.”

Multichannel Auxiliary Inputs and Master Faders

A multichannel Auxiliary Input or Master Fader is used as a return for the multichannel bus. Sends are useful when you need to create an additional, independent mix simultaneously (perhaps of a distinct format), requiring dedicated fader, mute, solo, and automation controls.

You can assign Master Faders to main and sub-paths. Main paths must match the format of the Master Fader, and only one Master Fader can be active and assigned to any single (active) main or sub-path. A Master Fader cannot be assigned to a sub-path if its associated main path is already assigned on another Master Fader. See “Master Fader Tracks and Signal Flow” on page 906.

Multichannel Instrument Tracks

Multichannel tracks can be used to monitor and route multichannel instrument plug-ins or multichannel external MIDI instruments.

Mono, Multi-Mono and Multichannel Plug-Ins

Plug-Ins can be used in mono, multi-mono, or multichannel formats.

For information about mono, stereo, and mono-in/stereo-out plug-ins, see Chapter 44, “Plug-In and Hardware Inserts.”

Multi-Mono Plug-Ins Are designed for use on stereo or greater-than-stereo multichannel tracks. Multi-mono plug-ins are useful, or required, in the following situations:

- When a plug-in does not involve multichannel correlated processing (for example, when applying EQ to select sides of a multichannel signal)
- When you need to adjust signals within the multichannel track independently
- When a plug-in does not support multichannel formats

When a multi-mono plug-in is first inserted on a multichannel track, the plug-in controls are linked. You can unlink them for independent adjustment. See “Linking and Unlinking Controls on Multi-Mono Plug-Ins” on page 1074 for more information.

Multi-mono plugs-ins can also be inserted on stereo tracks, to apply unlinked plug-ins on the left and right channels.

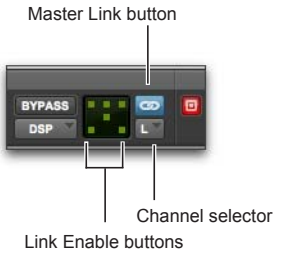
Multichannel Plug-Ins Are designed for use on stereo and multichannel tracks that require correlated processing, including stereo and multichannel limiting, compression, and similar effects.

Linking and Unlinking Controls on Multi-Mono Plug-Ins

When a multi-mono plug-in is used on a multichannel track of more than two channels, the controls are normally linked. Adjusting the Gain control on one channel, for example, will adjust it for all channels.

If necessary, you can unlink plug-in controls on specific channels of a track and edit them independently. You can also selectively link the controls of specific channels.

For example, to apply equal filter cutoffs to the Ls and Rs (surround) channels in a 5.1 mix, you could link enable just those channels in an unlinked, multi-mono EQ plug-in. Adjusting the controls in the plug-in window for either channel (Ls or Rs) adjusts the other, linked channel as well.



Channel selector and Link controls

Channel Selector Accesses a specific channel within a multichannel track for plug-in parameter editing. This menu appears only on multi-mono plug-ins inserted on tracks with more than two channels.

Master Link Button When enabled, links the controls on all channels of a multi-mono plug-in so that they can be adjusted in tandem.

Link Enable Buttons Let you selectively link the controls of specific channels of a multi-mono plug-in. Each square represents a speaker channel. The Master Link button must be disabled to use the Link Enable buttons.

To unlink controls on a multi-mono plug-in:

- Deselect the Master Link button. It is lit when linked, unlit when unlinked.

To access controls for a specific channel:

- Select the channel from the Channel selector.

To open a plug-in window for all channels of a multi-mono plug-in:

- Alt-click (Windows) or Option-click (Mac) the Channel selector.

To link the controls of specific channels:

1. Deselect the Master Link button if it is not already deselected.
2. Click the Link Enable buttons for the channels whose controls you want to link.

Paths in Surround Mixes

Because Pro Tools provides a flexible routing and submixing environment, you can maximize your system's available resources by first identifying the elements that you want to pan dynamically and those that can be placed in certain channels only (see "Mixing with Paths and Sub-Paths" on page 1075).

Once you have identified these elements in your session, you can use a combination of main and sub-path assignments, and multichannel panning.

Mixing with Paths and Sub-Paths

It is rare that every track needs to be "flown" (actively panned in between more than a pair of speakers). In most situations, certain elements are placed in certain speakers and remain there, providing the foundation for a mix.

The following figure illustrates an example of how panning and signal routing can be combined in a multichannel mix.

See "Extending Stereo Mixing Conventions to Surround Mixing" on page 1079 for related information.

When to Use Assign Multichannel Outputs

- Assign 5.1 paths only to those tracks that need to be panned to all six channels.

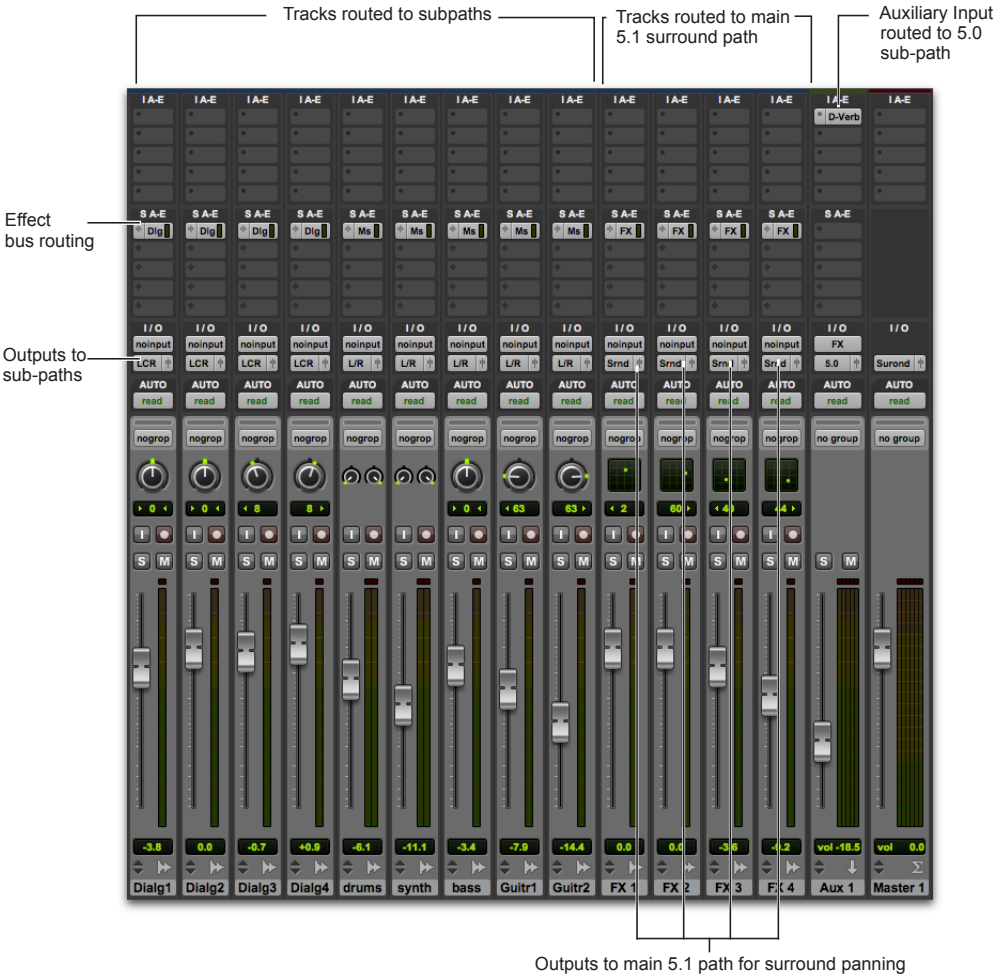
For example, a sound effects track with a jet flyover should be assigned a 5.1 path to fly the sound from front-to-back. In a music mix, you can fly a solo instrument or make a synth pad swirl around the room as a special effect.

Elements that need to be heard in all speakers simultaneously can also be assigned to the multichannel output, whether or not they require active panning in the sound field.

When to Use Sub-Paths

- To help simplify large sessions, use sub-paths to route *static* (or, stationary) elements directly to the output channel or channels.

For example, film dialog is often mixed to the center channel to anchor this essential sound element to the picture. Instead of assigning a six-channel panner to dialog tracks and panning the tracks to the center speaker only, you can route the dialog track's main output to a mono (Center) sub-path.



Using signal routing and sub-paths to mix in surround

Extending Stereo Mixing Conventions to Surround Mixing

Stereo mixing sets the precedent for active and static panning, and surround mixing can benefit from the same basic principles.

Panning a sound back-and-forth between the left and right speakers is best used as a special effect. In a typical music mix, the basic tracks are placed in the stereo sound field and remain there.

Surround mixes can become incoherent if too many elements are continuously moving, For special effects, some tracks can be panned *dynamically,* bouncing between speakers or sweeping from one side to the other.

Example Paths and Signal Routing for a Surround Mix

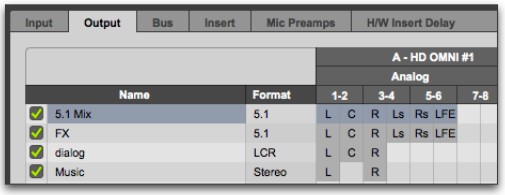
Signal routing is the key element in any Pro Tools surround session. Signal routing is configured and defined in the I/O Setup dialog.

The examples that follow show how Auxiliary Inputs, Master Faders, and other Pro Tools signal routing features can be used for stem mixes, submixes, and similar project needs.

In these examples, music and effects are being mixed for a trailer, in 5.1 surround. Separate stem mixes (for music and for effects) are to be mastered to 8-track MDM.

Example Output Paths

The following figure shows output paths defined in the I/O Setup dialog of an example session that was created on a Pro Tools|HDX system with an HD OMNI audio interface.



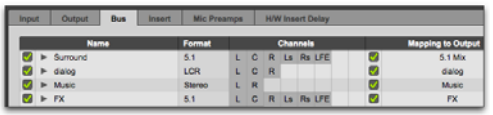
I/O Setup, example output paths

Different Output paths have been defined for Mix, FX, dialog, and Music.

Example Bus Paths

The following figure shows example bus paths.

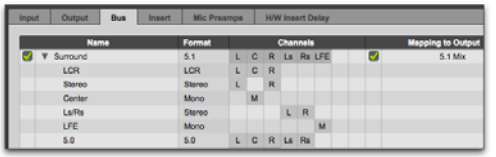
An LCR format path (“Dialog”), a stereo format path (“Music”) and a 5.1 format path (“FX”) have been defined, each with several their own subpaths.



I/O Setup, example bus paths

Example Sub-Paths

Sub-paths let you route to selective channels within the multichannel surround output. In the following figure, the Surround bus has several sub-paths that show this.



I/O Setup, example sub-paths

LCR Sub-Path The forward 3-channel sub-path. Use this type of sub-path routing to mix dialog, or other forward-facing sound effects.

Stereo Sub-Path The forward stereo sub-path. Use this type of sub-path routing to mix music stems and effects to the front left and right speakers.

Center Sub-Path The front center-channel sub-path provides a discrete mono path for the center channel.

Ls/Rs Sub-Path The surround, rear left and right stereo sub-path. Use this type of sub-path to mix surround effects.

LFE Path The LFE sub-path provides a discrete mono path for the LFE channel.

5.0 Sub-Path The 5.0 path is a 5-channel sub-path. Use this type of sub-path routing to conserve mixing resources with tracks you want to keep out of the LFE channel.

Signal Routing Examples

The following examples show how main and sub-paths can be used, using an example session consisting of a 5.1 main mix, with music and effects stems (or submixes).

Submix Stem Examples

The following figure shows a routing configuration for an effects submix. Two tracks are routed to stereo bus sub-paths, while others are assigned to an LCR and a mono bus sub-path. Two tracks (one mono, one stereo) are assigned to multichannel busses for surround panning. A 5.1 Auxiliary Input assigned to the FX main bus path serves as a sub-mixer.

Extending Stereo Mixing Conventions to Surround Mixing

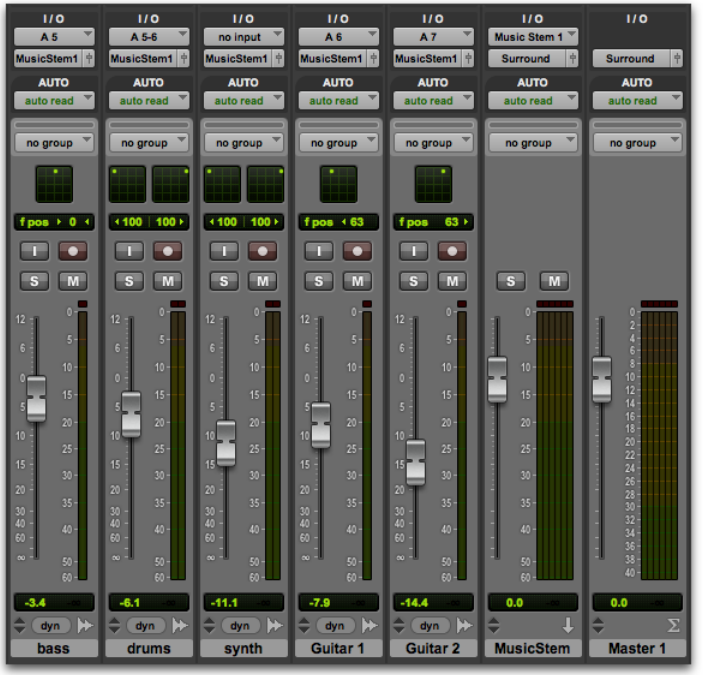
Stereo mixing sets the precedent for active and static panning, and surround mixing can benefit from the same basic principles.

Panning a sound back-and-forth between the left and right speakers is best used as a special effect. In a typical music mix, the basic tracks are placed in the stereo sound field and remain there.

Surround mixes can become incoherent if too many elements are continuously moving, For special effects, some tracks can be panned *dynamically,* bouncing between speakers or sweeping from one side to the other.

FX stem

The following figure shows a routing configuration for music tracks.



Music stem

Most of the music tracks in this example are routed to the front left/right channels, using a stereo sub-path. A 5.1 Auxiliary Input controls the bus and stem output.

Multiple Output Assignments

Multiple output assignments make it possible to configure a number of multi-format mixes. For example, you can assign an additional stereo output to tracks and create a stereo mix at the same time as a 5.1 mix. For more information, see “Multiple Output Assignments” on page 917.

LFE Examples

LFE tracks and other audio can contribute to the LFE output in two ways:

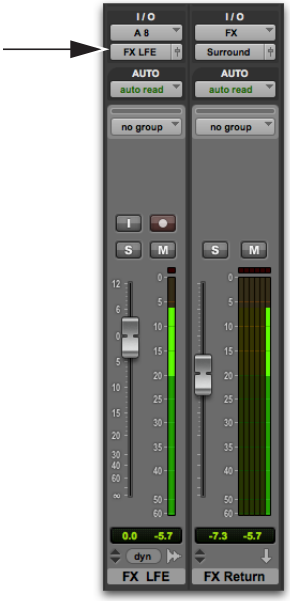
- Using the LFE fader in Output windows. This LFE signal is post-fader.
- Using a custom sub-path to route channels discretely.

The following figure shows a channel Output window, sending and metering the LFE channel.

LFE fader

Using the LFE fader, you can add any amount of any multichannel path to the overall LFE output. In the above example, the track's Center percentage has been turned off, and the LFE fader has been raised to route it to the LFE channel.

The following figure shows how a "traditional" LFE track can be routed to only the LFE channel. This example uses a custom-defined LFE sub-path to the FX main bus path.



Discrete LFE routing, with main output to mono LFE channel

LFE faders can follow Mix and Edit Groups. For information, see "Selecting Group Attributes" on page 251.

For instructions on creating a sub-path, see "Custom Multichannel Paths" on page 1065.

LFE and Filtering

Pro Tools applies no filtering to LFE signals. Some delivery requirements may require filtering for the LFE track.

Chapter 49: Surround Panning and Mixing

Before you can pan a track in surround, it must be assigned to an appropriate multichannel output or bus path.

See Chapter 47, "Pro Tools Setup for Surround" for more information on multichannel configurations and I/O Setup options. For multichannel signal routing, see Chapter 48, "Multichannel Tracks and Signal Routing."

Multichannel surround mixing is supported with Pro Tools HD only.

The I/O Setup dialog defines the busing and output architecture of the Pro Tools multichannel surround mixer. If you have not already done so, it is recommended that you become familiar with main and sub-paths and the I/O Setup dialog before starting multichannel Pro Tools projects.

Introduction to Pro Tools Surround Panning

(Pro Tools HD Only)

There are four different track panning methods available:

- In the Edit window, using the reduced-height Panner Grid in the I/O View
- In the Mix window, using the reduced-height Panner Grid
- In the Output window, using the full-size Panner Grid
- Through pan automation editing

Certain Pro Tools control surfaces provide additional panning options. See the documentation for your control surface.

Mix and Edit Window Panner Grids

In the Mix and Edit window, multichannel Panner Grids are displayed on tracks that have multichannel track or send output assignments.

To pan from the Mix or Edit window:

1 To pan in the Edit window, make sure I/O View is being shown (View > Edit Window > I/O). Panner Grids are always displayed in Mix window tracks that support panning.

2 Begin playback.

3 Drag in the appropriate multichannel track's Panner Grid in the Mix or Edit windows.

Drag to pan in the Track Grid

The Pan Location cursor follows your movements as long as you hold the mouse button. Movements are scaled so that, once you click to "grab" the Pan Location cursor, you do not need to limit your movements to the small Track Grid area.

Pan Location Cursor Color while Automating

The Pan Location cursor is green when the track is in Automation Read mode, red in an Automation Touch, Latch, Touch/Latch, or Write modes, and yellow in Automation Off (or Automation Suspend) mode.

In Trim mode, the Volume fader and LFE fader are yellow.

Output windows provide additional features and controls (and a much larger Grid). For details, see "Output Windows" on page 1084.

Output Windows

Output windows provide panning controls (called panners), as well as standard Pro Tools controls, for tracks of all mix formats (from 3-channel LCR through 8-channel 7.1).

For information on Output window standard controls, see "Standard Controls" on page 1085. For information on Output window panning controls, see "Surround Panner Controls" on page 1086.

Some of the features of Output windows include:

- X/Y (joystick-style) panning
- 3-Knob panning
- Full Divergence and Center Percentage control
- AutoGlide
- LFE feed
- Multichannel meters
- Pro Tools target window support

Multiple panners can be opened simultaneously, or a single window can display the current panner.

To open an Output window:

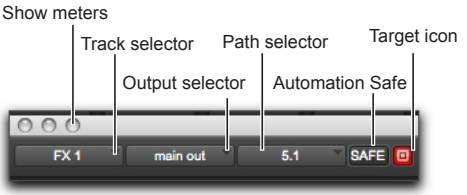
- Click the Output Window button (the small fader at the right edge of the Output selector for a track in the Mix or Edit window (I/O View).

Opening a multichannel Output window

For instructions on managing multiple Output windows, see "Output Windows for Tracks and Sends" on page 928.

Standard Controls

All Output windows provide standard Pro Tools controls for routing, path assignment and other track features. These controls are located at the top of all Output, Send, Insert, and Plug-In windows (see "Standard Selector Controls in Output Windows" on page 931).



Panner Control section

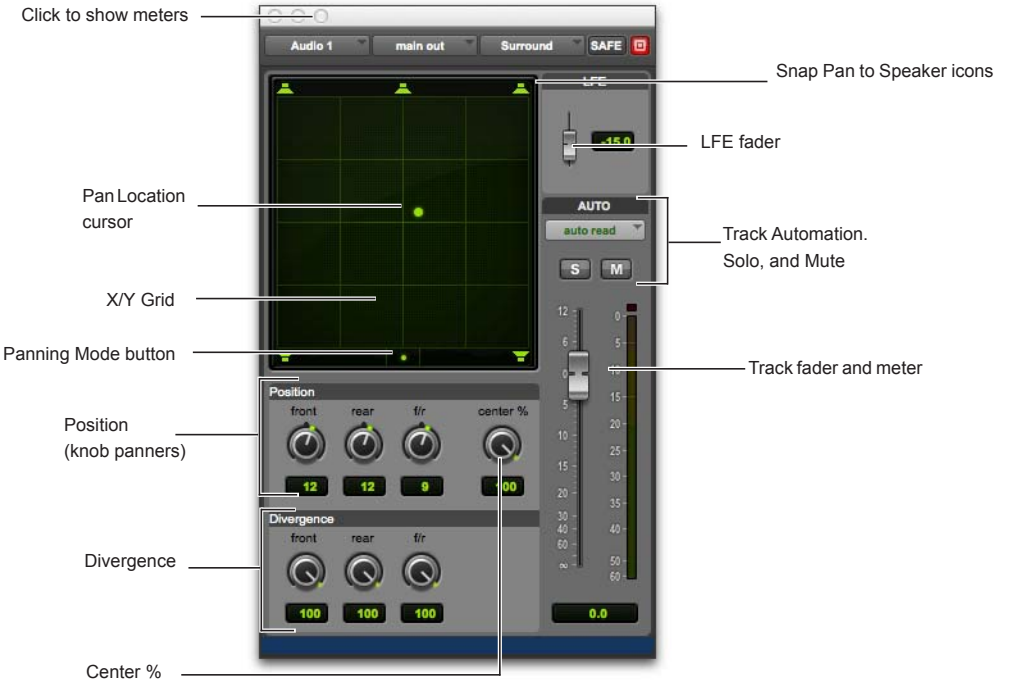
Track Fader, Solo, Mute, and Auto

All Output windows provide track volume and mute controls. You can adjust and automate track volume, or mute, directly using these controls. The larger fader and Mute button are equivalent to those in the Pro Tools Mix window.

Surround Panner Controls

When assigned to tracks or paths with four or more channels, the Output window provides an X/Y Grid for surround panning. The speakers associated with the panner's multichannel format are displayed in their relative positions outside the Panner Grid. These speakers are also used as Snap Pan to Speaker controls.

This section identifies all the controls and features found in Pro Tools multichannel panners.



Output window with a 7.1 format multichannel panner

The X/Y Grid and Pan Location Cursor

The X/Y Grid is where multichannel panning information is input and displayed. You can input pan information using X/Y mode, 3-Knob mode, or by entering numeric values in the Position data fields. You can also edit pan automation graphically in the Edit window.

Multichannel panners default to X/Y mode. In X/Y mode, the track's current pan position is represented by a green dot. This dot is the Pan Location cursor, and its color indicates track automation status using standard Pro Tools colors:

Green The track is in automation Read mode.

Red The track is in automation Write, Touch, Latch, or Touch/Latch mode.

Yellow The track is in automation Off mode (or Automation Suspend) mode.

Panning Mode Button

This button, located below the X/Y Grid, provides access to Surround panning modes (see "Panning Modes" on page 1088).

Position Controls

The Position controls let you set the positions of the panner.

Front Displays and controls the current front X-axis (left/right) position of the panner.

Rear Displays and controls the current rear X-axis (left/right) position of the panner. In default X/Y Panning mode, Rear is linked to Front position and cannot be controlled independently.

F/R (Front/Rear) Displays and controls the current Y-axis position of the panner.

Center % Control

Center % controls how much of the signal is routed to the center speaker. This lets you mix a track to the front with a phantom center (0% Center value) or to three-channel (LCR) when panning front.

Divergence Controls

Divergence determines the width of the panned signal with respect to neighboring speakers. (For more information, see the *Pro Tools Sync & Surround Concepts Guide*). There are three Divergence controls:

Front, Rear, and F/R Divergence Provide separate, automatable divergence control over front speakers, rear speakers, and between front/rear, respectively.

For examples of how divergence settings affect output panning, see "Divergence and Center Percentage" on page 1091.

Snap Pan to Speaker Icons

The Snap Pan to Speaker icons let you force the panner to the speaker's location. For example, clicking on the upper left speaker moves the Pan Location cursor to the upper left corner of the X/Y Grid.

LFE Fader

The LFE fader is only available in ".1" surround formats (5.1, 6.1, and 7.1).

The LFE fader determines how much of the current track's signal will be routed to the LFE channel. LFE faders in Track and Send windows can follow groups. The Pro Tools LFE channel is always full-bandwidth. For more information on how to use the LFE fader, see "LFE Faders in Multichannel Panners" on page 1094.

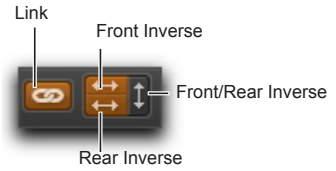
Multichannel Panner Linking

Stereo tracks with multichannel outputs provide left and right multichannel panners. The Output window provides controls to link the left and right channels for precise panning.

When you create a stereo track that is routed to a multichannel output, the following pan linkage controls are active by default:

- Link (links Left and Right pan controls)
- Front Inverse (inverts Left and Right pan control linkage across front)
- Rear Inverse (inverts Left and Right pan control linkage across rear)

The Front/Rear Inverse pan control is unlinked by default.



Stereo multichannel panner controls showing default linking

Panning Modes

The Panning Mode button provides access to four panning modes: X/Y mode, Divergence Editing, 3-Knob mode, and AutoGlide mode. Panning controls can be automated in all four modes.

Pro Tools provides the following Panning Modes:

X/Y Mode Joystick-style panning by dragging the Pan Location cursor within the X/Y Speaker Grid. See "X/Y Panning" on page 1088 for more information.

3-Knob Mode Point-to-point panning, between pairs of speakers. See "3-Knob Panning" on page 1089 for more information.

Divergence Editing The divergence X/Y Grid can be dragged to resize the divergence boundaries. See "Divergence Editing Mode" on page 1092.

AutoGlide Mode Point-to-point panning from the Pan Location cursor to a new destination over a specified AutoGlide Time. See "AutoGlide Mode" on page 1090 for more information.

To enable a Panning Mode:

- Click on the Panning Mode button in the Surround Panner until the mode icon is displayed.

X/Y Panning

To pan in X/Y mode:

1. Click on the Panning Mode button until the X/Y mode icon is displayed.
2. Drag the Pan Location cursor, or click anywhere in the Grid and drag to pan the track. The location of the Pan Location cursor determines the pan position of the signal. For example, to pan something to the left rear speaker, move the Pan Location cursor to the lower-left corner of the Grid.

It is not necessary to click exactly on the Pan Location cursor. Clicking anywhere in the Grid will move the Pan Location cursor relative to where you click or take over with a hardware panner. Panning does not jump to the click position.

To snap the Pan Location cursor to a location in the Grid:

- Control-Shift-click (Windows) or Command-Shift-click (Mac) at the location in the X/Y Grid.

Grid Options and Shortcuts

Fine-Adjust Mode Hold the Control key (Windows) or Command key (Mac) for fine adjustment of all Panner controls.

Constraining to X or Y Movement Shift-drag the Pan Location cursor to constrain its movement to the X or Y direction.

Reset to Default Alt-click (Windows) or Option-click (Mac) in the Panner Grid to reset all controls to their default position.

Snap Pan to Speaker Click one of the Snap Pan to Speaker icons to force the panner to that speaker location.

Display Automation in Edit Window Control-Start-click (Windows) or Command-Control-click (Mac) a control to display that control's playlist in the Edit window.

All Pan controls can be automated, including pan position and divergence. See Chapter 45, "Automation" for details.

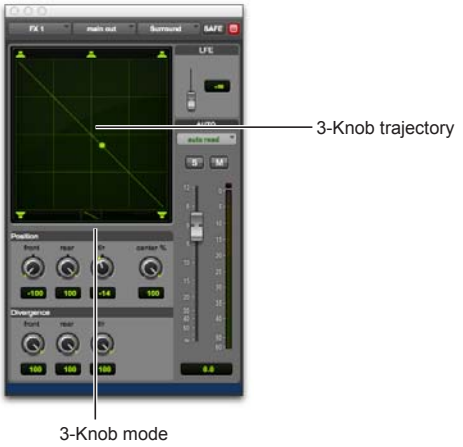
3-Knob Panning

Pro Tools provides 3-Knob mode as an additional way to input pan moves.

3-Knob mode lets you do the following:

- Pan in straight lines, moving the Pan Location cursor using the Position rotary knobs with full movement of front, rear, and front-rear position
- Pan discretely between pairs of speakers.

For example, when panning front-left to rear-right in 3-Knob mode, audio will be heard from just those two speakers (assuming full divergence is in effect).



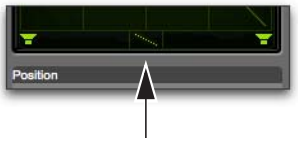
Panning and metering in 3-Knob mode

By comparison, in X/Y mode a diagonal pan may result in audio being heard in some or all channels.

The difference is that 3-Knob mode pans discretely between the front and rear position of the panning *trajectory*, while X/Y mode panning takes place in the full 360° Panning Grid. Divergence and Center Percentage are variable in both Panning modes.

To enable 3-Knob Panning mode:

- Click on the Panning Mode button until the 3-Knob mode icon is displayed.



Panner Mode button set to 3-Knob mode

The panner trajectory line appears across the Grid, extending from the front (X-axis) to the rear (Y-axis).

To pan in 3-Knob mode:

1 Adjust the Front and Rear Position knobs to set the trajectory line.

2 Rotate the Front/Rear Position knob to pan along the trajectory. The Pan Location cursor is constrained to the white trajectory line.

To change the 3-Knob trajectory angles, do one of the following:

- Drag either end point (Front or Rear) of the trajectory line.
- Adjust the Front or Rear Position controls.

To change the current trajectory position (left-to-right) and retain its current angles:

- Drag the trajectory line (not its end points) to a new position.

AutoGlide Mode

AutoGlide mode lets you quickly write Surround Panner automation by clicking new locations in the Surround Panner window, instead of manually moving the Surround Panner controls.

⚠ *When writing automation in AutoGlide mode, the Pan Location cursor cannot be dragged from its location.*

The time it takes to glide from point to point (from the Pan Location cursor to the new destination) is called the AutoGlide Time. This time is set in the Mixing Preferences page and has a range of 10 msec to 10000 msec (10 seconds).

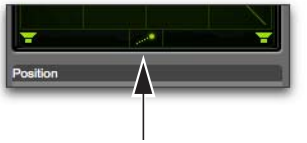
To set the AutoGlide Time

1 Choose Setup > Preferences and click Mixing.

2 Set the AutoGlide Time in the Automation section.

To do an AutoGlide automation pass:

1 Click the Panning Mode button until the AutoGlide mode icon is displayed.



Panner Mode button set to AutoGlide mode

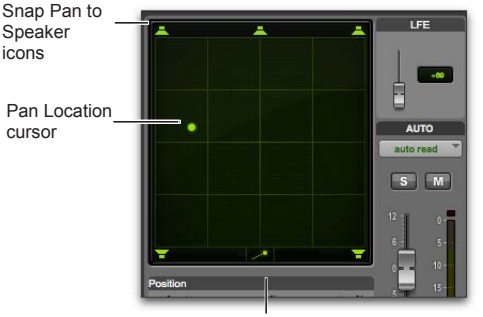
The Panning Mode button displays a slanted dotted line that ends with a filled in dot (representing a cursor) at its top right corner.

2 In the Mix or Edit window, click the Automation Mode selector and select an Automation mode for the track you want to automate.

3 Press Play to begin playback.

4 Set a new destination for the cursor by doing one of the following:

- Click a Snap Pan to Speaker icon to glide to its speaker location.
- Click in the pan window to glide to a specific location in the X/Y Grid.



Panning Mode button (AutoGlide mode shown)

The Pan Location cursor will begin to move towards the new destination in the time it takes to travel the AutoGlide Time. When the new destination point is reached, a new breakpoint will be written at the new location.

5 Repeat the previous step if you want to write additional panning moves.

6 Stop the transport when finished.

Divergence and Center Percentage

The Divergence and Center Percentage controls range from 0 to 100, and can be automated. They are especially useful for ensuring audibility and coverage in large venues, and to increase clarity of voices.

Front Divergence Controls divergence between front speakers (X-axis only).

Rear Divergence Controls divergence between the rear speakers (X-axis only).

Front/Rear Divergence Controls divergence between front and rear (the Y-axis).

Center % (Percentage) Determines whether there is a *discrete* center image, a completely *phantom* center image, or a variable amount in between.

Side % (Percentage) Determines whether there is a *discrete* side image, a completely *phantom* side image, or a variable amount in between the right and left side channels for 7.1 and 7.0 formats.

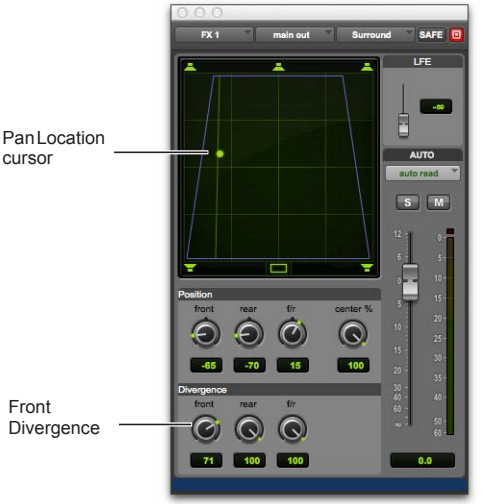
Divergence

In the Panner Grid, the current divergence values are displayed using a purple outline.

Divergence display and controls

By default, Pro Tools surround panners are 100% or fully divergent, meaning that a signal that is panned completely to one speaker will only be audible in that speaker.

Lower divergence settings result in a progressively wider source signal. When Divergence is less than 100%, tracks will be routed to neighboring speakers to some degree, even when the Pan Location cursor is positioned next to a single speaker.



Front Divergence at less than 100% for wider panning

To adjust divergence:

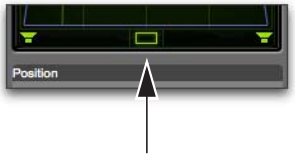
- Adjust the Front, Rear, and Front/Rear Divergence controls as necessary.

Divergence Editing Mode

In Divergence Editing mode, you can adjust the divergence boundaries by dragging directly in the Divergence Grid.

To adjust divergence graphically:

1 Click on the Panning Mode button until the Divergence Editing icon is displayed.



Panner Mode button set to Divergence Editing

2 Drag in the Grid to resize the divergence boundaries.

Center % (Percentage)

In LCR, LCRS, 5.0, 5.1, 6.0, 6.1 7.0, 7.0 SDDS, 7.1, and 7.1 SDDS surround formats, the Center % controls whether there is a discrete center channel for the track or a phantom center channel.

Center Percentage Example

In film and video production, the center channel often contains dialog. To enhance the clarity of dialog, it is often beneficial to keep elements such as music out of the center speaker. By reducing the Center Percentage on music tracks, music panned to the front of the soundfield can be panned to only the left and right speakers, forcing them to have a variable phantom center image.

To adjust Center Percentage:

- Adjust the Center Percentage knob.

As you reduce the Center Percentage value, the center speaker at the top of the Grid becomes less visible. At 0, the center speaker is completely invisible, reflecting the setting for fully phantom center.

Center % set to 0 (no center speaker shown)

Side % (Percentage)

For 7.1 and 7.0 surround formats, the Side % controls whether there are discrete side channels for the track or a phantom side channel.

To adjust Side Percentage:

- Adjust the Side Percentage knob.

As you reduce the Side Percentage value, the speakers at the sides of the Grid become less visible. At 0, the side speakers are completely invisible, reflecting the setting for fully phantom center.

Side % set to 50% (side center speakers dimmed)

LFE Faders in Multichannel Panners

The LFE fader controls how much of the track is sent to LFE. LFE faders are only available when a track is assigned to a path whose format supports LFE (5.1, 6.1, or 7.1).

For general information about LFE, sub channels, and related topics, see the Pro Tools Sync & Surround Concepts Guide.

To mix to the LFE channel:

- Adjust the LFE fader in any ".1" surround format Output window.

LFE Faders and Groups

Track and send LFE faders can follow Mix and Edit Groups by being enabled in the Group Attributes page in either the Create Groups or Modify Groups dialog. LFE faders can be assigned to follow groups as a global attribute or on a group by group basis. See "Selecting Group Attributes" on page 251.

LFE Enable

Some multichannel plug-ins, including the multichannel Dynamics III Compressor/Limiter, provide LFE Enable. This lets you enable or bypass processing of the LFE channel if present.

LFE Enable in the multichannel Dynamics III Compressor/Limiter

To process the LFE channel in a multichannel plug-in:

- Click to enable LFE Enable in supporting multichannel plug-ins. LFE Enable is highlighted when LFE processing is enabled, and unhighlighted when LFE processing is bypassed.

When LFE Enable is unavailable, try using the multi-mono version of the plug-in.

Pan Playlists

Multichannel panners have an automation playlist for each position and divergence control.

Pan automation can be drawn, edited, cut, copied, and pasted from the Edit window. For more information, see Chapter 45, "Automation."